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LECTURE

ON

MERCURIAL TRADE DISEASE.

BY

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PRESENTED by the AUTHOR.

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LECTURE ON MERCURIAL TRADE DISEASE.

Gentlemen,—As you have had an opportunity of seeing two cases of slow mercurial poisoning, and as the disease is due in a great measure to the neglect of precautions which should be made obligatory on manufacturers by the authorities to whom the care of the public health is entrusted, I have chosen these cases as the subject of my observations to you this morning.

The first, that of P. K., has been under Dr. Quinlan's care for some weeks, and he has kindly allowed me to refer to it. This man, who is aged 50, has worked for twenty years at the mirror silvering trade without intermission, except when disabled by the effects of the mercury. His habits have been temperate, porter being the only stimulant he took. He has been very neglectful of ablution before meals, and of ventilation in the room in which he worked. The first symptoms he suffered from were, coppery taste, salivation, weakness, depression, and irritability of spirits; but for about four years he did not suffer from the tremor. At this time the constant habit of his bowels was to move six times a day, and they were frequently over-distended with gas. He was very apt to sweat on making the least exertion, the perspiration having the peculiar mercurial fœtor. When admitted into hospital he was wretchedly emaciated, every muscle trembled, and he stuttered constantly. He had a very distinct purple spongy line along the teeth. His skin has a peculiar bluish paleness. He did not tremble during sleep, but was very uneasy and apt to start up.

The treatment which Dr. Quinlan most successfully employed consisted in iodide of potassium and generous diet, galvanism, and warm baths. The peculiar kind of stammering from which this poor fellow suffered has been called "psellismus mercurialis." This symptom was retained for thirty years in the case of Dixon, the anatomy porter of the College of Surgeons, who at one time rubbed in immense quantities of mercury for the cure of venereal among the "mohawks" or swells of that day. Professor Macnamara tells me that his chief difficulty lay in the pronouncing of long words, such, for instance, as that gentleman's polysyllabic name.

The second is that of J. T., who, although only 28 years of age, has been working at the silvering trade for sixteen years in this city and in Liverpool. Having been lately a patient for erysipelas in the Richmond Hospital under Dr. Fleming's care, that gentleman, knowing I was interested in the matter, kindly sent him afterwards to me. The first thing he observed on beginning the trade was a nasty taste in the mouth, not the usual taste of mercury distributed through the system, for it began in three or four hours after the first exposure. Salivation followed, and was renewed whenever he went back to work after an interval. So extreme had been the action on the mouth that he had lost nearly all his teeth, and, as in P. K.'s case, there was permanently a red spongy edge to his gums. He had at one time been as helpless as a child, and had suffered from incontinence of urine and fœces. He is now very bald, and this, with the characteristic paleness and wrinkled state of his face, gives him the appearance of a very old man. Loss of spirits, weakening of virile power, and disinclination for the least exertion or for amusement, were the early symptoms, and he at last became as apathetic as a sailor with sea scurvy, and, by the way, from the same cause, want of red blood-cells. He lost appetite for food, but drank porter rather plentifully. Spirits he could not touch, as a very small quantity would intoxicate him in his weakly state. He always had more or less of the "trembles," and even now, after several months' abstinence from work, shakes a little, and as the muscles have no enduring power of contraction, he cannot stand steadily. I may mention that he never knew a fellow-workman escape the disease in Dublin, whereas in Liverpool a minority suffered.

You see, therefore, that the ill-effects of this trade are very deplorable, and, if generally known, would cast an expression of sadness over many a face reflected in the mirrors, the making of which have caused the evils; but, happily, they are in a great measure preventible.

The nature of the disease is somewhat obscure, but must consist in one or more of the following conditions: the spoiling of the nervous tissue, of the muscular tissue, or of the blood, of which you know a pure and plentiful supply is wanted for active muscular movement. Into all of these components of our body albumen, and the substances allied to it enter most largely, and it may be that the mercurial salt coagulates and spoils them in the body, as it would in the chemists' test tube. A grain of corrosive sublimate will coagulate some hundreds of grains of albumen before its effects are neutralised. So that when Baron Thènard had accidentally taken a little of that poison he had to swallow as an antidote about a dozen eggs. The blood cells are composed of an albuminoid, and when they have disappeared by prolonged maceration in water, a drop of a solution of bichloride of mercury will coagulate this compound and make them reappear.

1. That it is not on the nervous tissue the mercury inflicts the greatest injury I think appears from the facts that its other functions—memory and sensation, for instance—are not impaired, and that in most cases cure follows avoidance of the poison and perhaps medical treatment within a few weeks. In two cases lately published in the "Bartholomew Hospital Reports," the symptoms, however, produced were those of acute mania, and in one the post-mortem appearances of the brain corresponded with this condition. The poison was introduced by the vapours of mercuric methide. The brain is no doubt highly albuminous, but that substance is contained in the interior of the nerve tubes, and is insulated by a coating of fat. Its remarkably low diffusive power also would tend to keep it within the tubes.

2. If an opportunity of examining the body of a silverer should arise, it will be possible to ascertain if the mercury has penetrated the sheaths of the ultimate muscular fibres and shrivelled the albuminoid within them, and that perhaps it still lurks there itself. I think, however, it is now generally believed that the excreting power of the body is capable of throwing out mineral poisons within a very few days, except perhaps from the lungs, liver, and kidneys, from which they may fail to get discharged. It is not recorded that in cases of mercurial poisoning the metal was found in the muscles.

There is one diseased condition of muscular fibre of which we know the intimate nature—namely, fatty degeneration, in which the musculin is found to be replaced within the sheaths by that fat known as adipocire. This change is accomplished by the evolution of nitrogen, for as no pores can be discovered in the sheath, it is hard to conceive how the musculin could be conveyed out and the fat conveyed in. The fatty muscle has not, however, the irregular mode of contraction which appears in mercurial tremor, but has that sluggish action we see in the muscles of a diseased limb, or of an over-fattened ox, or that proneness to stop altogether which we find in cases of death from fatty heart. However, it is probable that chemical degeneration of the muscle would lead to the trembling which follows mercurial poisoning, and that, whether the muscle be merely an instrument played on by the nerves or contracts by a force inherent in it, which question you know physiologists still dispute.

I am not aware if the intimate nature of the shaking palsy of old age has been demonstrated, but it is very similar to mercurial tremor, only differing in the fact that the muscles remain quiet if no effort be made to move them. It might be due to either of the foregoing conditions, or that now to be discussed.

3. From the time of Huxham, it is known that mercury spoils the red cells of the blood, and Dr. Farre says, "A full plethoric woman of a purple red complexion consulted me for hæmorrhage from the stomach depending on engorgement without organic disease. I gave her mercury, and in six weeks blanched her as white as a lily." We remark much the same every day in our wards, and the green evacuations of children after a dose of calomel are chemically identical with the colouring matter of the blood. The red cells are by no means permanent, but, on the contrary, are constantly being destroyed by the liver and cast off in the bile, the stock being renewed out of the white cells. This action of the liver is stimulated by mercury, and it is thus a course of that medicine pales the body, as that agent has spoiled many cells. Now, all the silverers I have met with have suffered, especially in the beginning while they had blood to lose, from bilious purging. It is this loss of red cells to even one-sixth of their amount, and necessarily higher proportion of white, which renders the blood of persons under mer-

cury buff and cupped when drawn, and a peculiar fœtid matter similar to that which is thrown off in the saliva and evacuations is found in that fluid.

You have probably heard of mercurial erythism, but from the moderate and careful way the drug is now given I nor you have ever seen it. Sir T. Moriarty, however, records that it was very common in Dublin in the beginning of this century. It consisted in sudden and sometimes fatal faintings, presumably due, as I suggested in my "Manual of Physiology" (2nd edition), to rapid destruction of the red cells and consequent failure of the heart's contraction. One of the most graphic accounts of the disease was related by Dr. Bateman, F.R.S., in the ninth vol. of the *Med. Chir. Trans.*, as occurring in his own person, and the prominent symptoms were weakness of the muscular tissue, including that around the intestines, which allowed the accumulation of gas to a most painful extent.

The secretion almost alone increased by mercury, when the action of the bowels is checked by the combination of opium, is the saliva, and this may have some connexion with the fact that it contains an albuminoid plentifully, and further it may be that the power of mercury of destroying the venereal poison and removing recently poured out lymph, may be by its coagulating power just as it acts on the albuminoids out of the body. It acts in high inflammation by spoiling the excess of blood cells. No tissue requires a more constant, abundant, and pure supply of blood than muscle when contracting; it is therefore easy to conceive that the stream spoiled by the mercury will lead to weak and irregular action. It may be said that the brain would equally suffer, but Chossat's experiments on the starvation of animals proved that while muscles failed and wasted first from the deficient supply of blood so produced, the brain held out almost to the last. In cases of acute mercurial poisoning the tremor appears within two or three days, and there is scarcely time enough, or poison enough, to produce much effect on the brain or muscles, but the increased action of the liver would rapidly impoverish the blood. Mercury has been, moreover, found in the blood, but so intimately combined with albumen that destructive distillation was necessary to extract it, and a decomposed form of albumen was found also in the blood.

Lead, you know, produces a palsy of the extensor muscles of the forearm (why these muscles alone is unexplained), and this is probably due to the direct action of the lead on their tissue, or on the posterior interosseous nerve which supplies them. I must acknowledge that it weakens my theory of the mercurial palsy, for it cannot be on the blood the lead has acted, else the forearm alone could not suffer. In a case of wasting palsy, in which a few muscles only were affected, Mr. Lockhart Clarke showed that the lesion in the spinal cord corresponded with the origin in that centre of the nerves which supplied them.

Treatment.—So much depends on a knowledge of the intimate nature of the affection that you will not be surprised to hear that there is much uncertainty about it. Believing that the disease consists in a want of good red blood, which the poison has spoiled, I would advise the most nutritious food, fresh air, and iron to improve it. Such treatment is in a few weeks capable of tripling the red cells. Pereira regards medicines as of no use, but others look on iodide of potassium as a specific, and believe that it acts by making a soluble compound with the mercury which escapes in the urine. This view is improbable, for the conversion into a soluble form of the poison should aggravate its effects as it circulated through the system, and the iodide of lead which would be produced in a similar manner in lead poisoning treated with iodide of potassium, is insoluble. The medicine may act by eliminating the albuminoid which has been spoiled by the mercury. Dr. Parkes, Professor of Hygiene at Netley Hospital, has found that the elimination by the kidney of both lead and mercury is increased by iodide of potassium. When mercury passes off in the urine there is always found at the same time in that secretion a peculiar albuminoid, probably combined with the metal. The skin is probably another great eliminating organ for metallic poisons, and baths are therefore most useful.

A bath containing sulphuret of potassium is very serviceable in lead poisoning, and it becomes blackened by the sulphuret of lead after the patient has been a few minutes in it. The same remedy might be useful in mercurial poisoning, or perhaps the salt might be given internally; for Orfila assures us the sulphuret of mercury is innocuous. A dose of sulphur will often stop salivation, as I learned some years ago from a general practitioner with whom I was treating a case in which the action of mercury had been excessive; it may act by forming a sulphuret of the metal.

Galvanism may be useful in the same way as it is with paralyzed muscles—namely, to supply an artificial stimulus and tc prevent their wasting, but it cannot remove the cause of the disease. Faradization is the most reliablef orm.

A gentleman stated to me lately that he read in some magazine years ago that persons intended as miners in mercury mines were rendered insusceptible of the effects of the metal by taking for two or three months previously large doses of arsenic. I have been able to obtain no confirmation of the statement, nor can I understand it; but, if true, it would suggest that arsenic would also be a curative agent.

I may mention that, notwithstanding the drenching of their systems with mercury, silverers are susceptible of the venereal poison in its worse forms, and even may require the internal administration of that medicine to cure them.

The process of silvering, as I saw it conducted, is to place a sheet of tin-foil on a large stone slab, and to pour over it mercury to about a quarter of an inch thick. The glass is then carefully slid over the surface of this amalgam, the oxide being removed to the sides of the stone or the grooves along them, and a lustrous surface being left next the glass. With small and inferior plates they sometimes place a sheet of paper between the mercury and the glass and then withdraw it. It is the oxide or dust, which, being diffused in the air, or introduced from the clothes or skin of the workmen, which produces the disease. On damp days, when mercury rapidly oxidizes, it is difficult to silver, and the men are induced to shut out the air and to raise the temperature by large fires. By such means the danger is greatly increased, as the mercury is vapourized, breathing is quicker, and the perspiring surface catches the mercury.

If the mercury be impure or mixed with dust, or the slab dirty, it will "tail" on the stone, oxidize freely, and so do more harm.

Workmen are affected with the mercury with remarkably different degrees of severity, which you will not be surprised to hear, if you remember the case related by Mr. Chevalier, in which two grains of calomel prescribed as a purgative proved fatal by salivation and necrosis of the jaw.

Any workmen showing susceptibility should be removed to some other branch of the business, or obliged to relinquish it altogether. That it is very hard to persuade them to such changes may be learned from a case related by Merat, in which both parents had been affected with trembles at his birth and until their death, yet he pursued the business in the most neglectful way.

Prevention I speak of last, because, being "better than cure," I wish to impress it on your memory. It can be accomplished, to a very great degree, by the following means:—1. Free ventilation to be attained by height of premises, open windows, and louvred shafts at the summit of the rooms, or best of all, a special fan and shaft; the mercurial particles will be in these ways carried off. 2. The wearing while at work only of some easily washed dress. 3. Abundant opportunities for ablution of the hands and mouth after leaving work, and always before meals, which should not be eaten in the work-rooms. Frequent baths are also most useful. 4. The wearing of a wire gauze covering over the mouth, nose, and ears; a handkerchief is now occasionally used over the mouth, in the way which even Pliny described, but gives very slight protection. I may mention that of these and similar precautionary measures the men are very neglectful, as is the case also with steel-workers, who can be rarely induced to wear the magnetized gauze, which is most effectual in excluding the particles of that metal. From this astonishing neglect, the average of life of Sheffield grinders is reduced by one-half. 5. Means of catching the dust, such as sheets of strong paper with holes in them placed in advance of the walls. The dust passes through the holes and may be collected in troughs along the edge of the floor. Round the edge of the silvering stone there is a groove for collecting the dust, and it strikes me that if glycerine or some other sticky matter were placed in it or at the edge of the stone, the dust could not rise. Water would not suit for this purpose, as the vapour from it would dull the silvered surface, but the dust might be perhaps swept frequently from the groove into a vessel of water on the floor. The dust is preserved for the purpose of being distilled, and at all times should be kept in air-tight vessels, for mercury volatilises even at ordinary temperatures. 6. Working only at intervals, such as every second day, with an occasional month's respite altogether; this is the habit in England, but no intermission is usual in Dublin. From such neglect it follows that no one going to the business in this city ever escapes the disease, whereas Dr. Whitley, who reported on the subject for the Privy Council, in describing a London establishment says:—"No well-marked case had occurred for many years among men who had worked there only, and he believed that in well-arranged workshops, with cleanliness and temperance, the danger, except to those peculiarly sensitive, is not great. All that I observed in most of the other places I visited served to confirm the above."

At present the legislature does not empower any one to interfere with this and many other injurious employments in this country, but the Public Health (Ireland) Act, which has been drawn up by the Government, I rejoice to say, provides for their due regulation; and an extension of the Factory Acts might arrange the due number of hours of work. At present not more than eight or nine persons are engaged at silvering in Dublin, but the business is increasing. For the entire prevention of the ill effects of mercurial trades, we must appeal to the noble science of chemistry, of all branches of knowledge the most useful to man, and it may be possible by some such method as precipitating the mercury to avoid the danger altogether. Gilding with an amalgam of mercury and gold was most noxious, but has now been superseded by electro-plating. Some other trades which use mercury, as barometer makers and furriers, also suffer from its effects, as do likewise to a fearful degree the miners who work at Almaden and Idria, near Trieste, where the metal is obtained. In 1803 a fire broke out in the latter mine, and over 900 persons in the neighbourhood were attacked with the trembles. At these mines even at present the mode of extraction is so rude that the miners suffer from the fumes most lamentably. Mercury being volatile, it may occasion disease if it be not carefully stored; thus in 1810, the *Triumph*, man-of-war, having taken a large quantity of the metal from a wreck, the bags burst, and 200 of the men were salivated, and every animal, including birds, mice, and even cockroaches, were destroyed. It was at one time asserted that the corrosive sublimate in the timber, preserved by Kyan's process, was injurious to sailors, but a commission of the French Academy in 1836 disproved the statement.

Before we separate I wish to draw your attention to the case of consumption in the same ward, for this man also owes his disease to an ill-regulated trade. He has been working for about twenty years in a flour-mill near this city, and partly from cupidity and partly from obedience to his employer, for refusal would lead to dismissal, he has often worked both day and night, two hours in the evening alone being given to sleep. He continued to work in this way for six days and nights on one late occasion, but being seized with spitting of blood, he was admitted into hospital. Exhaustion from length of labour, and the entrance of flour particles into his lungs, for these places are often ill-ventilated, excited his disease, and there are very few of the men who work at the trade who do not suffer from difficulty of breathing from the latter cause. In steam-mills night work is not usually allowed, but in water-mills, as the power is so limited, day, night, and Sabbath are alike. Is not such a system to be deplored, and is not legislative interference called for?

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